SUMMARIES FOR PROJECTS FUNDED UNDER FY1995 NSF/EPA VALUATION AND ENVIRONMENTAL POLICY ANNOUNCEMENT

In Fiscal Year (FY) 1995 EPA and NSF issued a joint solicitation on "Valuation and Environmental Policy." This competition was intended to support research projects in four areas: 1) fundamental concepts; 2) stated preference methods; 3) ecosystem valuation; and 4) valuing environmental resources in national economic accounts. Sixteen projects were funded by EPA (14 projects) and NSF (2 projects). Total funds awarded were $2,334,939. Although it is difficult to narrowly characterize the projects among the four areas, the majority of projects funded were in stated preference methods such as contingent valuation, conjoint analysis and contingent ranking.

The project summaries for all funded projects follow.

PROJECT SUMMARY
CARNEGIE MELLON UNIVERSITY
HADI DOWLATABADI, BARUCH FISCHHOFF, GEORGE LOEWENSTEIN
(GFA-9525516/R824706)

Eliciting Environmental Values: A Constructivist Approach

This pilot project proposes an integrated program of basic and applied research designed to create a "constructivist" approach to eliciting environmental values. This approach assumes that there are circumstances in which individuals must construct their values for specific environmental changes, out of basic values regarding the kinds of tradeoffs that are involved. Facilitating this process requires a rather different methodology and, in some ways, a different philosophy of science than conventional survey research. The applied component of the research will develop, evaluate, and document the methodology in several applied settings. These include situations demanding evaluation of specific goods (the domain contingent evaluation) of proposed policy measures (the domain public opinion polling) and of government principles for environmental decisions. The basic research component of the research considers fundamental questions arising from this approach. These include peoples's ability to articulate and predict their values in unfamiliar situations, people's strategies for dealing with the demands of competing public goods, and people's elaboration of incompletely specified tasks. The three principal investigators bring the perspectives of psychology, economics and environmental science to these tasks.

PROJECT SUMMARY
COLORADO SCHOOL OF MINES
GRAHAM DAVIS, IMAD ELHAJ
(GFA-9525563/R824705)

Valuing the Stock and Flow of Mineral and Renewable Assets in National Income Accounting

This project will advance the field of environmental asset valuation so that additions to and depletions of these resources may be included in national economic accounts. The project specifically focuses on the valuation of minerals and renewable biological resources. The broad objectives of the project are to assess and critique the existing methods of valuing commercial natural resources and to improve upon and supplement these methods by producing valuation methodologies that take into account price, stock, and development timing uncertainty. The new valuation methods will be applied to both proved/produced and unproved/nonproduced commercial natural resources, such as minerals, fish, timber, and land.

The methods to be employed consist of modifications to existing valuation formulations, such as the Hotelling Valuation Principle, and the application of a new valuation technique known as multinomial option pricing of real assets. The valuation tools that are developed will be both more accurate and cover a more comprehensive list of assets than previous valuations. To demonstrate the usefulness of the new valuation tools, the stock of proved and unproved mineral assets within the united States will be valued using these techniques.

PROJECT SUMMARY
CORNELL UNIVERSITY - ENDOWED
GREGORY POE, WILLIAM SCHULZE
(GFA-9525576/R824688)

Can Contingent Valuation Measure Passive-Use Values?

The study will examine with field experimentation the criticism of Contingent Valuation (CV) that hypothetical survey responses may not accurately predict actual behavior (validity). A research team of economists and psychologists who span the range of viewpoints on CV has been formed to address the validity issue. Investigators propose to take advantage of a green pricing program offered by Niagara Mohawk Power Corporation. Niagara Mohawk plans to make annual offerings using an incentive compatible public good auction mechanism (a provision point with a money back guarantee) to provide specific green projects. This approach is unlike prior green pricing programs which have allowed free riding and have had poorly defined products. The first offering, if funded by customers, will provide an opportunity to purchase a landfill gas recovery project and plant 50,000 trees. Since Niagra Mohawk must offer the program to all customers, and since the air quality benefits of the landfill project will accrue locally, passive-use values may be present. This proposed research will utilize the second green offering, planned for the early summer of 1996. Five alternative CV elicitation methods, with two context variants, would be employed with an attempt to estimate customer values prior to implementation of the second offering. These estimated values can then be compared with the actual customer values obtained in the public good auction. This opportunity to conduct a social experiment will help answer fundamental questions concerning the validity of CV, identify which methods, if any, are most appropriate, as well as allow for development of a calibration factor, etc.

PROJECT SUMMARY
DECISION SCIENCE RESEARCH INSTITUTE
ROBIN GREGORY
(GFA-9525582)

Methods Development in Using Constructive Survey Approaches to Value Nonmarket Environmental Resources

Survey instruments, ranging from those designed to elicit contingent valuations to those that collect attitudes and opinions about policy options, are used as information sources to determine environmental policy and program actions. However, the current survey methods do not accurately represent the multidimensional and nonmonetary nature of the resource values that must be considered in the policy process. Therefore, this project develops a research program on two promising new environmental survey approaches, which appear to offer distinct advantages in providing comprehensive and focused databases on public responses to the issues and concerns policy makers are expected to address. The decision pathways approach asks respondents a series of interrelated questions, each of which has several answers. The choice of answers creates a decision path for each respondent, which in turn reveals the preferred resource management options and the reasoning strategies. The value integration approach begins by identifying the components of value relevant to the issue and assists respondents in using this knowledge to make informed tradeoff across alternative environmental policies. Both proposed survey approaches reflect the insights of behavioral decision theory and recognize the constructive nature of complex environmental values.

PROJECT SUMMARY
COLORADO STATE UNIVERSITY
ALAN COVICH, KURT FAUSCH, JOHN B. LOOMIS
(GFA-9525502/ EPA)
(To be funded in 1996)

Measuring Societal Perceptions, Attitudes and Economic Benefits of Ecological Integrity and Biodiversity by Extending Contingent Valuation Methods Surveys

The project proposes to draw on interdisciplinary expertise to translate the concept and measurement of ecological integrity into the flow of services provided by maintaining intact, self-regulating ecosystems. Diagrammatic and narrative presentations will be developed to communicate these services using survey instruments. In-person interview techniques will be used to administer the survey to the general public as well as to knowledgeable groups to measure: 1) understanding of and attitude toward native versus non-native species; 2) importance of restoring a Western Great Plains aquatic ecosystem; and 3) their willingness to pay to protect more diverse, self-regulating ecosystems. A specific outcome of this project is to test the feasibility of measuring public knowledge about attitude toward and willingness to pay for restoration of ecological integrity. It will measure the direct use and public trust values of increased instream flow and water quality in terms of supporting a diversity of interconnected species, riparian vegetation, and recreation opportunities. The measurement will be accomplished using a variety of social indicators including attitudes, preferences, ordinal rankings, and willingness to pay.

PROJECT SUMMARY
DUKE UNIVERSITY
CAROL MANSFIELD
(GFA-9525554\R824687)

Improving Willingness to Accept Responses Using Alternative Forms of Compensation

The study will employ a survey design used by Viscusi, Magat and Huber (VMH, 1991) in which they offered respondents both risk-dollar trade-offs and risk-risk trade-offs in order to value changes in risk. Participants will be asked to make choices trading off living near a waste disposal facility with two different forms of compensation: in one case, money, and in another case, a public good. Individuals will also be asked for their willingness-to-pay (WTP) for the public good. Using the VMH methodology, the value of WTA can be inferred without having to ask a traditional WTA dollars-for-environmental-degradation question. The survey will be administered to respondents from two separate samples representing different socio-economic backgrounds. Psychological inputs to the model will be evaluated. The results will be used to examine how the differences in income and other individual characteristics affect preferences.

PROJECT SUMMARY
GEORGE MASON UNIVERSITY
THOMAS DIETZ, GREGORY GUAGNANO, PAUL STERN
(GFA-9525571/R824693)

Social Psychology of Stated Preference

The proposed research will explore the social psychology of expressed willingness to pay (WTP) for environmental improvements in order to gain understanding of question-wording effects, examine whether structured value elicitation techniques can mitigate them, and explore the comparative advantage of the contingent valuation method (CVM) and more interactive and discursive methods of assessing social value. Sensitivity of CVM to question wording (e.g., embedding effects) is troublesome if WTP is presumed to directly reflect underlying preferences, but from the standpoint of a constructive theory of preferences and from knowledge gained from surveying other subjective phenomena, such phenomena are normal. They can be interpreted as reflecting framing or focus effects, in which wording influences WTP by altering the cognitive shortcuts individuals use to construct their responses. Two experiments are proposed: 1) to examine framing effects and analyze respondents cognitive processes to determine whether cognitive focusing mediates the effects, and 2) an exploration of ways to minimize focus effects in eliciting social value.

PROJECT SUMMARY
GEORGIA STATE UNIVERSITY
RONALD CUMMINGS
(GFA-9525580/R824710)

Valuing Environmental Damages With Stated Preference Methods: New Approaches That Yield Demonstrably Valid Values for Non-Priced, Environmental Goods

The objective of this project is to explore and develop new stated preference valuation institutions–i.e., new Contingent Valuation (CV) methodologies. This thrust is motivated by our interest in methods that yield demonstrably valid estimates of environmental values. The project will extend the investigators' ongoing work with two new designs for the CV methodology that have been shown to elicit responses to hypothetical valuation questions that are indistinguishable from parallel valuation questions requiring actual payment. These designs, a "Cheap Talk" design and a "Learning" design, draw from lessons learned in experimental economics and psychology concerning the design of valuation institutions. Research that more fully develops these designs can be expected to provide guidelines for the conduct of stated preference studies that produce valid responses to hypothetical valuation questions.

PROJECT SUMMARY
REGENTS OF THE UNIVERSITY OF CALIFORNIA
NEIL MAXWELL, GORDON RAUSSER
(GFA-9525565/R824707)

Deriving Biodiversity Option Value Within a Model of Biotechnology Research and Development

The project will derive formulas for computing option values within a dynamic model of biotechnological innovation. The approach employs formal economic models and rigorous methods of analysis to clarify the economic effects of introducing new goods, the role of genetic materials as an input to the research and development process, and the imputed option value of the existing stock of genetic resources. It views biodiversity conservation–the preservation of genetic materials–and biotechnology research and development–the incorporation of genetic materials into goods providing economic utility–as components of a single problem, that of determining the optimal use of genetic resources for economic benefit. The claim is that, given a general theory for valuing innovations, the value options on potential innovations can be analyzed using tools well-established in the literature on finance. This framework could then be applied in an empirical study to estimate the option value associated with preservation of wild crop varieties.

PROJECT SUMMARY
RESOURCES FOR THE FUTURE
ANNA ALBERINI, MAUREEN CROPPER, JON KROSNICK, ALAN KRUPNICK
(GFA-9525557/R824711)

Mortality Risk Valuation and Stated Preference Methods: An Exploratory Study

The proposed interdisciplinary research seeks to improve understanding of the perception and valuation of risks to life through the conduct of personal interviews, focus groups, and a pilot contingent valuation study. Specifically, the proposal will examine the effect of various dimensions of risk on willingness to pay (WTP) to reduce risk of death by obtaining (WTP) responses to a series of commodities. The exact specification of the commodities will be determined in the course of the research. However, our starting point would include, at one extreme, a commodity in which risk is seen as limited to oneself (or one's family), voluntary, immediate, and accidental and, at the other extreme, a commodity in which risk includes others (to be addressed through a new public program), is involuntarily borne, is latent, and is a result of pollution.

The research design will also provide information relevant to the recent debates over requirements for using split samples for testing responsiveness of WTP to commodity scope (as opposed to using the cheaper within-sample test design). Specifically, the effect of latent vs. immediate mortality risk on WTP will be tested both within respondents and using a split sample design.

PROJECT SUMMARY
UNIVERSITY OF CALIFORNIA IN SAN DIEGO
RICHARD CARSON, THEODORE GROVES, MARK MARCHINA
(GFA-9525540\R824698)

Comparative Statistics of Approaches Eliciting Economic Values

This project will look at the properties of a number of different stated preference approaches to eliciting information useful for estimating the economic value of a change in an environmental amenity. Elicitation methods will be characterized in terms of: 1) the information it conveys to survey respondents; 2) the nature of the message space available for responses; and 3) beliefs about how those messages will be used. Traditionally, the psychology and survey research literature has only examined (2). For each elicitation format the explicit (or usual) assumption will be considered as well as a range of plausible alternatives. The statistical nature of the information revealed by different elicitation methods will also be examined. The results of this work should be of substantial use to researchers seeking to determine which elicitation method they should use in different situations. The results of this work should also be of substantial use to policy analysts seeking to interpret estimates from existing environmental valuation studies.

PROJECT SUMMARY
UNIVERSITY OF COLORADO, BOULDER
NICHOLAS FLORES
(GFA-9525553\R824671)

Environmental Values and National Economic Accounts: Theoretical Inquiry

In recent years, suggestions have been made for revising or supplementing national economic accounts so that they reflect welfare changes associated with the degradation of environmental goods and natural resources. This project will provide a comprehensive theoretical examination of potential account revisions. The examination will seek to answer the question: which national account revisions provide information that allows for meaningful comparisons of social welfare?

The project will consist of three phases. In the first phase, relevant literature concerning environmental accounting, general national economic accounts, microeconomic theory of social welfare, and price indices will be surveyed. A very broad literature survey is proposed because although most discussions of national accounts and environmental values appear in recent years, there is an historical dialogue regarding the degree to which national economic accounts reflect social welfare. In the second phase, the concepts of virtual expenditures and virtual prices (marginal values of environmental goods) will be adapted to a multi-period consumption model of market and environmental goods. Virtual prices provide the basis for valuing future environmental service flows and virtual expenditures represent the value of current-period consumption of market goods and environmental service flows. When using existing theoretical results on the properties virtual prices, the concepts of virtual expenditures and virtual prices offer considerable potential for analyzing and interpreting national economic account revisions. The third and final phase of the project will consist of integrating the existing literature and phase two microeconomic analysis to provide recommendations regarding the revision or supplementation of national economic accounts.

PROJECT SUMMARY
UNIVERSITY OF NEW MEXICO
ROBERT BERRENS, DAVID BROOKSHIRE, PHILIP GANDERTON, HANK JENKINS-SMITH,
HILLARD KAPLAN, MICHAEL MCKEE
(GFA-9525528/R824679)

Preference Formation and Elicitation in Valuing Non-Market Goods

Within the general topic of valuation and environmental policy this interdisciplinary research project is directed to both the exploration of fundamental valuation concepts, and the examination of stated preference measurement approaches (e.g. contingent valuation). The general research object is to investigate the interaction between value formation and value elicitation.. The basic premise is that an understanding of how individuals from environmental values (e.g., purchase versus contribution model) cannot be decoupled from the value statement problem, and the choice of elicitation mechanism. The corollary premise is that social context is an important, but relatively unexplored determinant of both value formation and value statement. The methods to be employed in this research will include a unique combination and sequencing of field surveys and laboratory experiments. The field research will be a series of telephone surveys, with some sample treatments augmented by informational mailings. In addition to valuation questions, the telephone surveys collect detailed demographic and attitudinal

information. Final cross validation will be by full mail survey with the same sampling frame. The field research will be integrated with a series of laboratory experiments on public goods provision. The results of this research will aid in the assessment of current stated preference methods and guidelines, and expand the knowledge of interaction between value formation and value elicitation.

PROJECT SUMMARY
UNIVERSITY OF PENNSYLVANIA
JONATHAN BARON
(9520288)

Development of a Theory of Values and Their Measurement

A theory of values and their measurement will be developed on the basis of two distinctions among types of values: protected values vs. well-behaved values, and fundamental vs. proxy values. Protected values, in contrast to well behaved values, resist tradeoffs with other values and concern means rather than ends. For example, some people think that destruction of species by logging should be stopped at any cost. Proxy values are stan-ins for fundamental values, to which they are related through beliefs (often uncertain). For example, percent of children vaccinated is a proxy for disease prevention to which it is related by beliefs about vaccine effectiveness. These distinctions can help us understand inconsistency involve insensitivity to quantity (e.g., insensitivity to range in assigning relative weights to attributes, quantity insensitivity in contingent valuation), and nonconsequential principles that lead to different valuations of identical outcomes achieved by different means (e.g., use of cost rather than benefit in contingent valuation, omission bias). Hypotheses regarding the sources of these inconsistencies will be tested by examining the effects of: fundamental vs. proxy values; information relating to proxy fundamental values; manipulations of the measurement task to bring subjects' approach in line with its purpose; and combinations of these manipulations. It will also be determined whether increased consistency within each of two measures will increase agreement between them.

PROJECT SUMMARY
UNIVERSITY OF RHODE ISLAND
JAMES OPALUCH, STEPHEN SWALLOW
(9525527)

Developing Conjoint Stated Preference Methods for Valuation of Environmental Resources within their Ecological Context

This proposal describes research to further develop methods for valuing environmental resources within a complex context. The proposed research will evaluate methods to address these challenges through two avenues of research: 1) the usefulness of valuation methods that do not rely exclusively on money-measures of value; and 2) the potential to extend available methods of resource valuation when individuals face cognitive limits. The methods of : “conjoint analysis” provide a means to address these avenues of research in cases where economic analysis relies upon stated preferences of individuals. The principal objectives of the proposed project are: 1) to test and to compare alternative means of estimating relative values of natural resources using conjoint analysis; 2) to implement and to test measurement of monetary values using conjoint analysis; 3) to use conjoint analysis to develop and test models of human preferences that recognize resource values are dependent upon the ecological contest; 4) to expand the

neoclassical economic basis of conjoint analysis to consider concepts such as strength of preference indicators, fuzzy logic, effects of complexity and ambivalence theory; and 5) to develop and to test alternative survey methods for measuring values.

PROJECT SUMMARY
VANDERBILT UNIVERSITY
VIRGINIA DALE, CLIFFORD RUSSELL
(9525534)

Relating Ecological Indicators to Societal Values

The research will target "Valuation and Environmental Policy." The proposed work will build on research currently underway with EPA's Environmental Monitoring and Assessment Program (EMAP) project on the subject of "Relating EMAP Indicators to Societal Values." The EMAP project involves exploring, via focus groups and formal surveys, how lay individuals relate to environmental conditions of a case study ecosystem–the forest and related water system of the Southern Appalachians–and how these relations can be explored via the provision of information about forest conditions in terms of a relatively few summary indicators of forest condition. The research will study the problems of ecosystem valuation and contingent valuation.